DOCUMENT RESUME

ED 188 865 SE 030 895

AUTHOR Swanson, Richard L.
TITLE Angel Island, Teacher's Guide, Part III: The Data Book--Land, Life, and Culture.
INSTITUTION California State Dept. of Parks and Recreation, Sacramento.
PUB DATE Mar 80
NOTE 56p.: For related documents, see SE 030 894-898. Photographs may not reproduce well.

EDRS PRICE MF01/PC03 Plus Postage.
DESCRIPTORS *Class Activities: Conservation Education: Ecology: Elementary Education: Environment: *Environmental Education: *Field Trips: History: Interdisciplinary Approach: Natural Resources: *Nature Centers: *Outdoor Education: *Science Education: Social Studies

ABSTRACT

This guide is intended to assist teachers in the exploration of an island outdoor study area with particular attention to the interrelationships of the island's ecology and history. The guide is divided into two sections, one dealing with the natural history of the island, and the second with the human cultural history. Approaches to the examination of this area are generalizeable to other outdoor study efforts. It can serve as an example of a guide to others developing guides. (RE)

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# ANGEL ISLAND TEACHER'S GUIDE PART III Land, Life, and Culture

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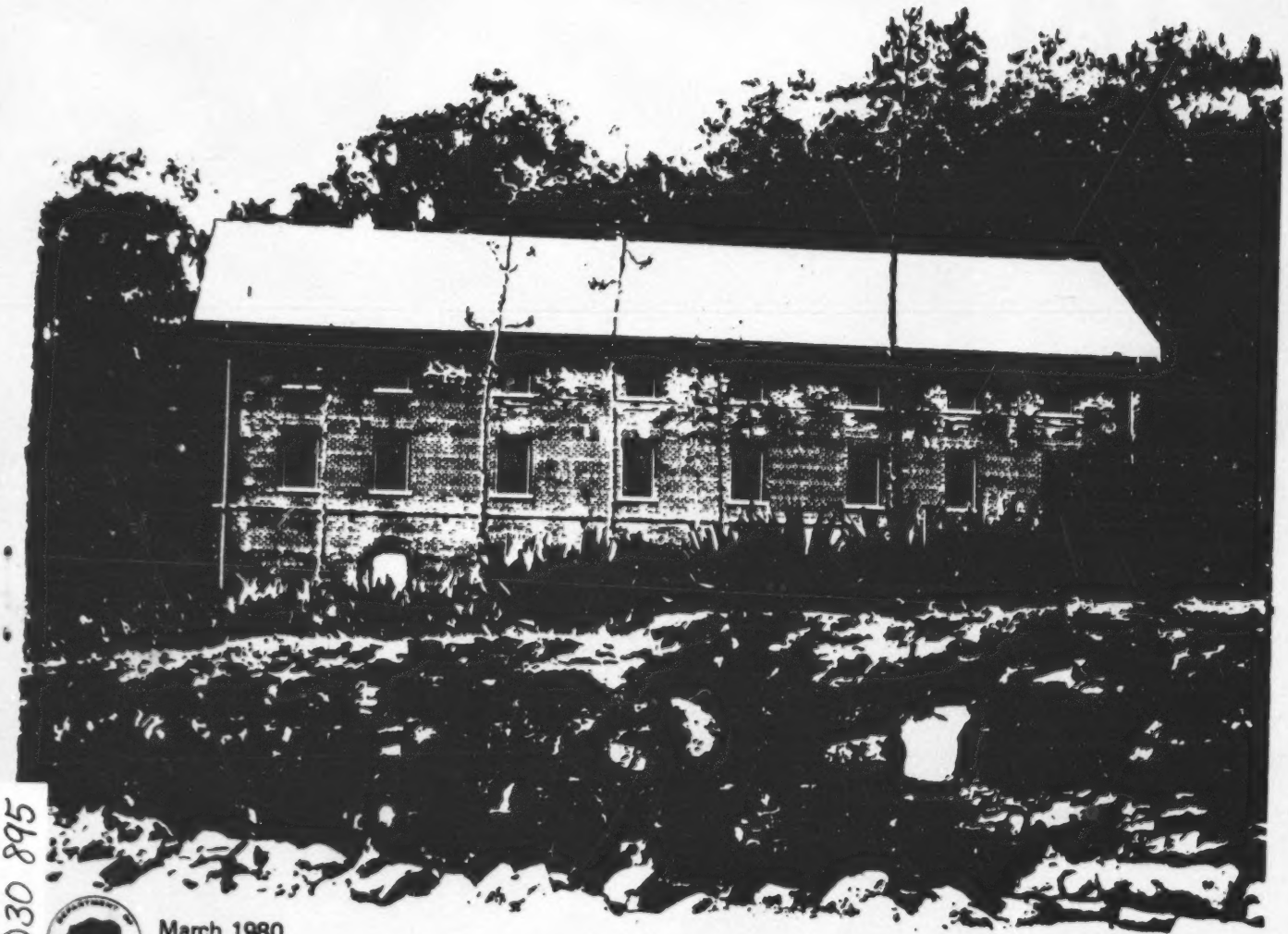

SE 030 895

March 1980

State of California — The Resources Agency
DEPARTMENT OF PARKS & RECREATION

Publication of this *Angel Island Teacher's Guide* was funded from the state's Environmental Protection Fund, derived from the purchase of personalized license plates.

# ANGEL ISLAND

# TEACHER'S GUIDE

## Part III

## The Data Book –

## Land, Life, and Culture

March 1980

*By*

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To the teacher:

This data book is your information source for the area you will be visiting. First, read it from beginning to end as a guide for teaching your preparatory unit lessons. Then refer to it from time to time for specific data by consulting the subheadings or the topical words in the margins.

To the student:

This book was designed for you. It tells you about Angel Island and the Coast Miwok Indians and Army personnel who used to live there. You can read it like a book, or just to look up facts.

If you are looking for facts, first decide what you want to know. Is it something about the land or the living things on a particular part of the island? Or is it something about the Coast Miwok Indians? Look in the Table of Contents for the section and subheading you believe might have the answer. Turn to that subheading and then begin looking in the page margins for a fact that interests you.

## LAND AND LIFE

Angel Island, with its fine views and varied landscape, offers many excellent sites for outdoor environmental education. While not a truly "wild" area in the sense of being untouched by people, it has much natural beauty. It has an interesting cultural heritage resulting from settlements by Indians and the U.S. Army.

### The Island's Beginning

*Birth of the bay*

The formation of San Francisco Bay and its islands is a relatively recent event in the earth's history. The bay area, as we know it today, was formed by changing sea levels and the rising of mountains within the last 20 million years. This seems like a long time, but not when we look at the age of the earth. If we were to compare the earth to a 50-year-old pine tree, then the formation of San Francisco Bay and Angel Island, like the growth of a new branch on the tree, would have taken about three months.

*Island once part of Marin*

Angel Island was formed at a time when the whole bay was high and dry and the ocean was many miles to the west and much lower than today. At first, the island was a part of the Marin Peninsula, but as the ancient Sacramento River cut its way through to the ocean, it sliced off what would be Angel Island from the rest of the hills of Marin. When the ocean level rose after the Ice Age, seawater filled the valley we now call San Francisco Bay. At the same time, Angel Island was created. The riverbed exists today as the deep channel which runs through Raccoon Straits and the Golden Gate to the ocean.

### The Island Today

When the land of the San Francisco Bay Area was first thrust up above sea level, it was, of course, just bare rock. Millions of years of wind, rain, and expansion and contraction (caused by very high and very low temperatures) gradually weathered the rocks. This weathering changed the shapes, colors, textures, and sizes of the rocks and eventually formed a base layer of soil.

*Origin of soils*

Of course, soil isn't just small bits of rock. At some time plants came to this land – perhaps they were carried to these shores by ocean currents or perhaps by the winds. As these plants lived and died, layers of soil were built up. The decaying plants mixing with the crumbled rocks made a material that could supply new plants with food and in which plant roots could take hold. So – ever so slowly – the earth covering the rocks was formed.

The *kind* of soil you find in a particular place depends on a lot of things. But the type of rock from which the soil was made is one of the most important. In turn, the kind of soil has a lot to do with determining what plants can grow in that place. Some plants are tough and hardy; they can grow in "poor" soils – soils that may have less nutrients (food) and a coarse texture that doesn't hold onto water well. Other plants need "rich" soils – ones that have a lot of nutrients and retain moisture.

***Different habitats***

A variety of plants grow on Angel Island and in the waters around it. The different kinds of soils and differences in weather and climate have created a number of distinct *habitats*. A habitat is an area in which the physical features (soil, weather, elevation) are just right for a group of plants that grow well together (plant association). The group of plants make a habitat in which certain animals prefer to live. These different habitats are named either for the chief kind of plant that grows well in the area or for the chief geographic feature of the area. The main habitats of Angel Island are:

a) The bay
b) Intertidal zone
c) Coastal strand
d) Coastal scrub
e) Grassland
f) Mixed evergreen forest
g) Chaparral
h) Introduced forests
i) Developed areas

***Habitats don't have walls***

The habitat areas do NOT have sharp boundaries. A particular plant or animal may thrive in grassland areas, but a few individuals of that species may be found living in a forest area. It is also true that some plants or

animals may live in several different areas, while some others may be found only in one of the habitats – or even in one small portion of a habitat. For example, a scrub jay may be seen anywhere on the island, although there will be more in some areas than in others. But an acorn barnacle will only be found near the high water mark of the intertidal zone.

Now, if the habitats cover very large areas and are undisturbed by man, such as portions of the prairies of the Midwest or forests in the Sierra, they will have typical plants and animals that live and die right there. Because the environment suits them so well, normally there will be no reason for the animals to migrate.

***Angel is different***

But Angel Island is different on two counts. First, it is an island with limited space and food. Second, people have changed the island many times in the last 200 years, and have disturbed the plant and animal communities. For both of these reasons many animals and plants on Angel Island have had to adapt to a less than ideal habitat. Also, because the island is small, it is easier for both plants and animals to move into habitats they would not normally choose to live in. This is a good example of how living things adapt to existing conditions.

***Leeward and windward***

Like almost every island in the world, Angel Island is influenced by the sea and the wind. The side that is most exposed to the prevailing winds takes much more punishment than the sheltered side. The windy side of any island is called the windward side and the sheltered side is called the leeward side (pronounced *loo-ward* by seafaring people). The windward side of Angel Island is quite often foggy and cold. The plants are bent and shaped by the wind. The shoreline and cliffs near the water are beaten by the waves. The leeward side is more protected and warmer. These differences make life on one side very different from the other. Although the kinds of soils and the exposure to sun and rain are more important in determining where plants and animals live, the winds also affect where living things thrive. They even affect where people settle. People almost always prefer warmer, more sheltered places to colder, windier ones.

***Areas of interest***

For your field trip, you can choose among these areas of interest on either side of the island:

| *Leeward* | *Windward* |
|---|---|
| Ayala Cove-Visitors Center | The road above Point Ione |
| Ayala Cove-Waterfront | West Garrison (Camp Reynolds) |
| The road above Point Campbell | |

## Island Geology

Most of the rocks found on Angel Island are very old. They were formed on the floor of an ancient ocean about 120 million to 190 million years ago. Originally these rocks were sandstone, shale, chert, and basalt. The sandstone and shale are *sedimentary* rocks -- made from small particles being deposited and pressed together. Chert and basalt are *igneous* rocks – made from molten materials from deep within the earth. However, during millions of years the ocean floor in this area shifted and folded; the original rocks were buried under much heavier rocks and altered physically and chemically. We call these altered rocks *metamorphic* (changed) rocks.

***Rock types***

The metamorphic sedimentary rocks break down easily to form deep clay soils which hold lots of water. Such soils are very good for plants. This type of rock material can be found at the summit of Mt. Livermore.

Metamorphic basalt rocks are large, dense, fine-grained rocks. Often you will find wisps of the blue mineral *glaucophane* within these rocks. Soil from this material is reddish brown in color because it contains a lot of iron which tends to rust. The lighthouse at Stuart Point sits on metamorphic basalt.

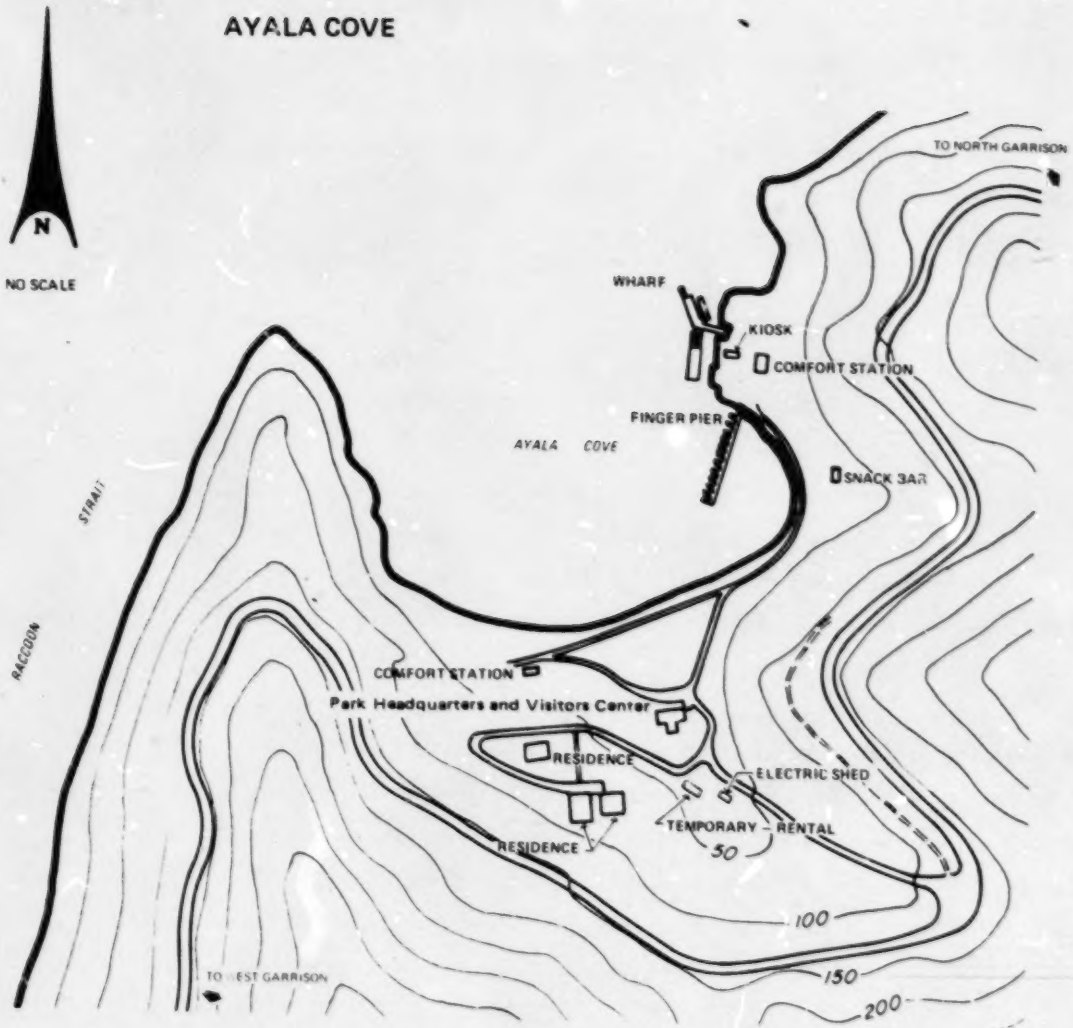
Chert rocks are dense and hard and are usually reddish brown. If you look closely at a piece of chert through a magnifying glass, you may see a few tiny black specks in the rock. These are probably the skeletons of microscopic marine animals called radiolaria. Chert can be found near Stuart Point and the eastern side of Ayala Cove. Because it is very difficult to change chert chemically, it can scarcely make any soil. The soil you find in areas of chert probably slid down from higher slopes to cover the chert.

***Chert***

Another kind of metamorphic rock found on Angel Island is serpentine. This bluish-green rock is the official state rock. Serpentine is a soft rock that feels soapy or greasy. A narrow band of this rock occurs west of Mt. Livermore, about halfway between the summit and Stuart and Knox points. Soils from

***Soaplike green rock***

## AYALA COVE




LEGEND

- BUILDINGS
- RUINS
- ROADS
- TRAILS

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serpentine contain a lot of magnesium, an element that is toxic (poisonous) to most plants. Therefore, only a few plants grow well in areas of serpentine rock.

Most of the unchanged sedimentary rock on Angel Island is a form of sandstone called the Franciscan Formation. Like the metamorphic sedimentary rocks, the unchanged sedimentary rocks make good soils. *Franciscan*

A very interesting kind of sandstone called the Colma Formation is found on the southern part of the island, about 200 feet above the present sea level. This sandstone was deposited on the ocean floor during the last few million years. Thus, we can conclude that either the island has risen or sea level has dropped in the recent (geologically speaking) past. *Colma*

These locations are accessible to a class of children on foot and include all nine types of habitats. (The points themselves are not open to the public because of steep, hazardous cliffs. East Garrison and North Garrison and the rock quarry are not recommended for field trips.) In addition, the class can hike up Mt. Livermore to view the entire island. The hike will take most of the day, but the view is an unsurpassed teaching tool for explaining the geography of the island and San Francisco Bay.

## The Leeward Side of the Island

### Ayala Cove

Ayala Cove is the entry point for all island visitors except, perhaps, an occasional yacht crew that anchors off Quarry Beach and rows to the island's leeward side. Nearly all its major features are visible by boat as you approach the island. As you enter the cove from Raccoon Straits, the rock cliffs above the cove dominate the view. In front of you lies a calm little bay, a sandy beach, and a long expanse of green grass and pine trees. Beyond you will see the buildings of the old maritime quarantine station once operated by U.S. *Major features*

public health authorities. This is the site of the park headquarters and the Visitors Center, which contains historical and natural history displays and a three-dimensional topographic map of the island. Behind and above the buildings lies a steep canyon lined with mixed evergreen trees.

### *Rocky Area*

As you get off the dock and onto the island look directly above. There is a rock cliff that tells much of the island's geologic history. The cliff and most of the rock on the island is a form of sandstone called the Franciscan Formation. This sedimentary rock was once ocean sand and mud that settled on the bottom, was pushed tightly together, and was covered by more sand and mud. The orange-gray sandstone formed by this process is cracked and easily broken.

***Franciscan***

In the north corner of the cliff is a large patch of hard, bright red rock called chert. It is the type of rock local Indians used for making tools like arrowheads and mortars. Whether this particular rock was used by the Indians, we can only guess.

***Chert***

Almost all the rocky areas on the island are very similar to this cliff above the cove. They are dry and steep, and the soil is poor. The conditions are not good for a lush growth of plants, or for animals.

The few plants that grow on the rocks are hardy, woody chaparral types. Sticky monkey flower (an orange-flowered bush), coyote bush, and some wildflowers, like the California lilac and the primrose, spot the rocky area. The animals that live there must have body parts (structures) and actions (behaviors) which adapt them to the steep, dry slopes. The animals of the rocky cliffs at the cove and on the rest of the island are all small. They include the fence lizard, an occasional hawk or wren, and insects such as beetles, ants, crickets, and butterflies, including the swallowtail and buckeye butterfly.

***Plants and animals***

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People have had an effect on this rocky cliff. The rock area in the cove gets more human use than any other exposed rock area on the whole island. As a result, there are not as many animals and plants found in this area as at other rocky areas. Don't be surprised if you go a whole day without seeing any of the more typical animals of the rocky areas. These animals try to avoid people, and so they stay away when a lot of people are present. If you want to look at the animals, you will do better if you go up into the hills away from most people. There you will find rocky places, next to the roads and on the edges of the fire trails of Mount Livermore, where animals can be found.

***Animals avoid people***

### *Developed Area*

The rocky cliffs of the dock area may be the first sight you pass as you arrive on the island, but the most obvious feature of the cove is the area developed by people. The cove, as well as a great many areas of the island, has been drastically changed. Today we see large expanses of grass, picnic facilities, a rock wall near the shore, roads, tall Monterey pines, and several beautiful Louisiana-style buildings with wide porches. The buildings of Ayala Cove were constructed by the U.S. government as part of a quarantine station for ships arriving from foreign ports. These ships were inspected to prevent disease from spreading from foreign ports. People immigrating to the U.S. were processed at a large Immigration Station that was built in 1910 at Winslow Cove on the north side of the island.

***Ayala Cove***

The area has changed greatly in the last 100 years. When Spanish explorer Juan Manuel de Ayala (in 1775) and author Richard Henry Dana (in 1830s) visited the island, it was covered with a rich growth of trees. Dana, in his book *Two Years Before the Mast*, tells us that island wood was used for heating and cooking during long ocean voyages by sailing ships. By 1900 only a few trees were left, and the island was mostly covered with grass. People are still affecting the island, and here at the cove the effects are greatest because this is where most people tend to picnic, play catch, and enjoy other activities.

***Most trees were cut***

Tree cutting was not the only change affecting the island's natural environment. Hillsides were leveled, and little streams and drainage ways were put into underground pipes. Lawn grass cannot survive in the dry California weather without irrigation, so sprinklers were installed to keep the lawns growing. Most plants in the disturbed areas of Angel Island are not native, and often need people to water them and protect them from harm. Exotic plants were brought to Angel Island from all over the United States and the world by Army personnel. Cactus from Arizona and flowers from the Philippines were among the imported plants.

***Plants brought in***

The animals of the developed areas are all well adapted to people. They hide when people are present and come out when they leave. As a result, the only times you are likely to see animals in this area are at night, in the early morning, or during winter weekdays when few visitors come to the island. Fortunately, winter weekdays are generally when school groups can come to the island. Animals of this area include cockroaches (which live in bathrooms and old buildings), rats, house mice, raccoons, and some birds, like the creeper and nuthatch.

***Animals adapt to people***

Raccoons are less shy than other animals. Because of Angel Island's limited food supply, the raccoon has learned to live off garbage and even eat from a person's hand. Although it might seem like a good idea to feed the raccoons, it is not, for two reasons. First, it is dangerous to feed any wild animal by hand. Second, the raccoons grow to depend on people for their food. When garbage is plentiful during the summer, the raccoons have an easy time finding food. During the winter, when not as many people come to the island, the amount of edible garbage decreases. Then there are too many raccoons and not enough food for them all. That is why it is important to keep garbage in locked cans away from the raccoons so they will depend on natural foods.

***Raccoons eat garbage***

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## *The Beach*

Like the rocky areas of the cove, the sandy beach has not escaped the effects of the thousands of people who have visited Ayala Cove. The beach is kept relatively clean by the park's personnel. Any item on the beach is turned over and examined by visitors.

In an area like the cove, you would expect to find many things on the beach. Flotsam and jetsam (the bits and pieces of floating wood, seaweed, sea foam, and many other things) float by the island in the strong currents of Raccoon Straits. Anything washed into the cove stays there because the currents don't sweep the cove completely clean.

***Junk washes ashore***

When there is an incoming tide, the water hits the eastern tip of the cove and whirls in toward the beach where it slows down enough to drop its sand. When the tide goes out, the current hits the western side of the cove and whirls toward the beach. So coming or going, the currents bring floating things into the cove.

***Currents of cove***

Some of these things may be from the ocean. These come on the incoming tide from the Golden Gate. Some of these may be from the mountains and rivers of inland California and come to the cove from the Sacramento and San Joaquin rivers. Their waters pass constantly through Raccoon Straits. Still other things are dumped straight into the bay from many places around it. If you watch the floating objects in the water, you will see how they are moved by the cove's currents and eddies.

The wave action eventually washes these things onto the shore. In more natural circumstances, this would mean that kelp, dead fish, and other organic matter (once live material) would wash up onto the beach. This, in turn, would supply a great deal of food for such things as beach hoppers, sand fleas, and isopods (which are similar to the common garden pillbug).

Unfortunately, so much manmade garbage has been dumped into the bay that it is just as common for old plastic coffee cups and oil to wash up onto the beach as it is for natural edible things. So to keep the park free of this manmade garbage, the park people clean the beach of all items, including natural ones. If you want to see the natural life of a beach, it is better to go to beaches on the north side of Stuart Point or at West Garrison.

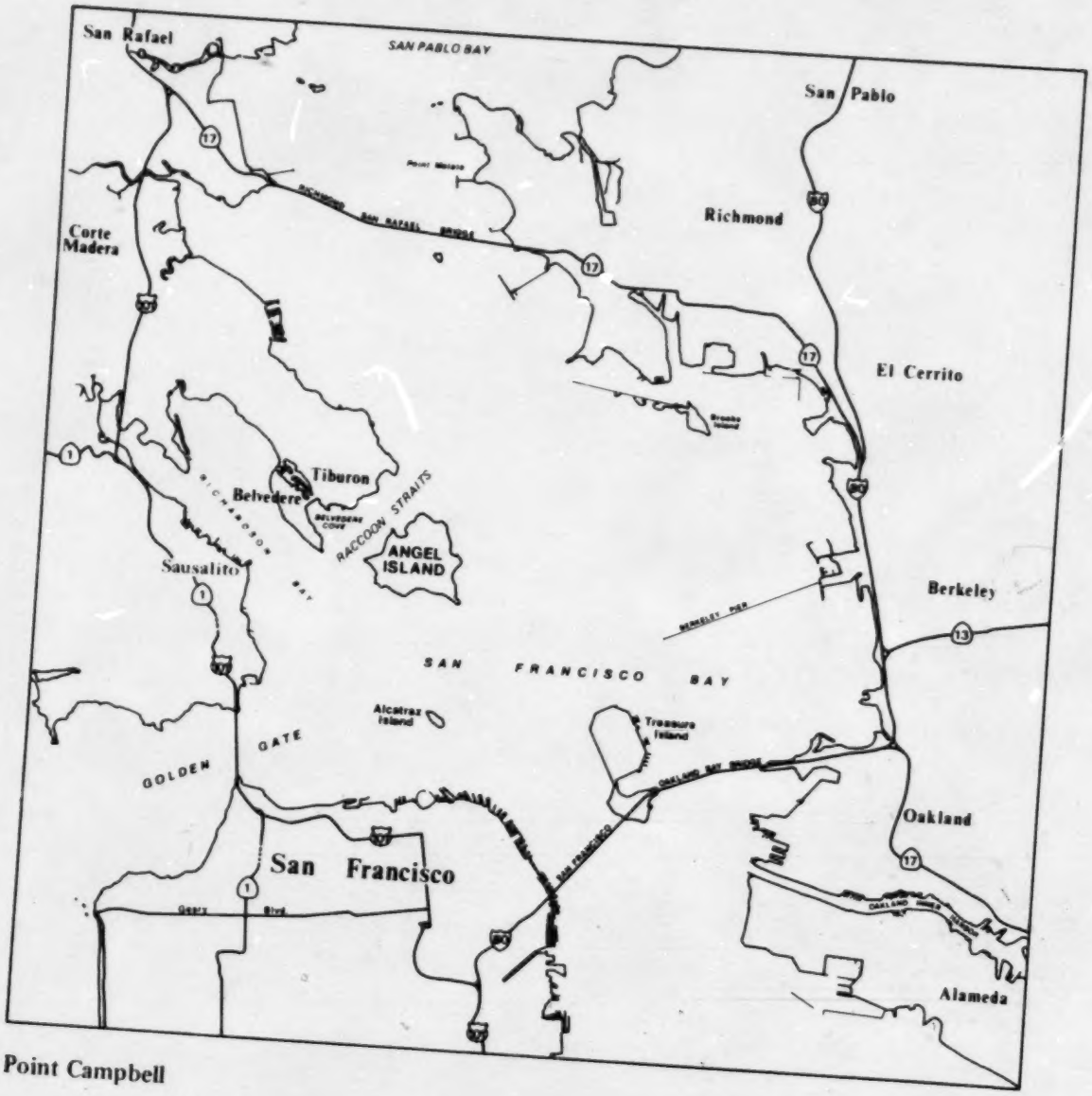
***Shore crab***

Because thousands of people visit Ayala Cove, the beach animals avoid contact with them and are seldom seen. The shore crab lives and hides among the rocks of the retaining wall area next to the beach. If caught by the leg by a quick predator, it is able to shed its leg to be able to run off to safety.

***Sand crab***

The sand crab lives underneath the beach sand at the edge of the water. It moves up the beach when the tide comes in, and out again when the tide goes out. It is surprising to find sand crabs at Angel Island because their usual habitat is the surfy shores of ocean beaches.

Beach hoppers (small jumping insects) and other insects would be more common at the cove's beach if their food supply wasn't cleaned off the beach so quickly. They don't grow there in any great numbers.




**Point Campbell**

Point Campbell is a 12-minute walk northeast from Ayala Cove. From the point you have an almost unobstructed view of Raccoon Straits. This deep and narrow channel got its name from a British sloop, "The Raccoon," a sailing ship that was repaired in the shelter of Ayala Cove in 1814.

***View of Raccoon Straits***

Directly to the west of the point is Belvedere and even farther west is Sausalito. To the north is the Tiburon Peninsula and to the northeast is the large expanse of San Pablo Bay, the Richmond-San Rafael bridge, Red Rock, and the islands called The Brothers further on.

***Trees of forest*** As you walk to Point Campbell you will pass by a wooded canyon behind the Ayala Cove area. This densely overgrown area was once stripped for firewood by sailors of the 1800s. Mixed evergreen forest is found in this canyon and on the whole north side of the island, and on the lee (sheltered) side of most of the ridges. The forest in the canyon includes the coast live oak, big-leaf maples, madrones, and California bays, to name a few. These trees range in age from 60 years (the madrone) to almost 2[illegible] years (the maple).

Underneath these trees are plant species that thrive in the cool shade. These include miner's lettuce (an edible plant), hound's tongue, sword fern, and other ferns like the beautiful maidenhair. These delicate moisture-loving plants are very sensitive to light and are totally dependent on the protective umbrella of the larger trees. Without this protection, all the smaller plants would dry up.

***Poison oak!*** The forest shadows are often also the home of poison oak, whose oily substance can bring out small itchy bumps on the skin of the unfortunate people who touch it. Caution is needed to avoid poison oak in the forest. Watch out for its vine-like branches and its leaves, which grow together in groups of three. A good eye and a little care make poison oak no problem to the island visitor.

Because the forest's dense undergrowth and its poison oak do a good job of keeping people out, the forest is a good place for larger animals to hide. It is a favored spot of deer.

***Deer multiplied*** Deer were brought to the island and now there are too many. There are no predators (consumers) that eat the deer, so they multiply quickly. The result is there are too many deer on the island for the available amount of food, so the weaker deer starve.

If you look at much of the mixed evergreen forest, notice that the bottom leaves and branches of many trees look as if a gardener had trimmed them in a straight line about four feet above the ground. A gardener has not been at

work. It was the hungry deer. They have eaten every edible piece up as far as they can reach. The deer's habit of eating shrubs, leaves, and bushes is called browsing. The line they leave on the trees is called the browse line.

***Browse line***

*Tree with browse line*

*Normal tree*

*Deer*

Besides trees, deer eat the native ceanothus and lawn grass, Sometimes when food gets scarce, they also eat coyote bush and sage.

Common animals of the mixed evergreen forest, besides deer, include the scrub jay (which eats a great variety of foods); seed-eating birds like the towhee, sparrow, and quail; and an occasional vole, a small mouse-like animal. The owl also frequents this woody area. It hunts small mammals and several types of lizards found on the island. Snakes like the gopher snake and rubber boa are also present. Owls and snakes are some of the predators (consumers) on the island. Animals that are predators eat other animals, such as forest beetles, spiders, centipedes, small rodents like the vole, and lizards like the alligator lizard and fence lizard.

***Other animals***

*Valley quail*

*Great Horned Owl*

***Angel Island mole***

A special mole is found on the edges of these forest where they meet the grasslands. This is a native animal found only on this island. It is the Angel Island mole. It occupies places in the envirnoment that on the mainland would be occupied by the ground squirrel and the pocket gopher. The mole's hump-like tunnels can be seen in several places on the island. It is a predator and eats worms and undergroud insects. It does much to loosen and aerate the island soils.

Many animals normally found in forests, chaparral, and grasslands are not found on Angel Island. Missing from the island are ground squirrels, gophers rabbits, tree squirrels, white-footed mice, and wood rats, all common on the Marin peninsula.

***Don't eat plants!***

The elderberry (berries) and miner's lettuce, plants in this forest, can be eaten by people. However, unless you are experienced in identifying edible plants, we don't recommend that you try eating anything off the forest floor. A mistake can be dangerous.

## The Chaparral

***Woody plants***

On the ridge just behind Point Campbell is an area of dry, low-lying bushes known as chaparral. Chaparral is made up of hardy plants, and equally hardy animals live there, including some also found in the forest. Plants of the chaparral include woody ones like coyote bush and manzanita. Other plants found in the chaparral are chamise, ceanothus, and honeysuckle.

Snakes are also found here, preying on small mammals and other animals. Above the chaparral fly turkey vultures and hawks, looking for something to eat. The hawks include the red-tailed and the Cooper's hawk. None of these hawks appear to be full-time residents. They stop by the island for a while to rest and eat before moving on.

***Bird flyway***

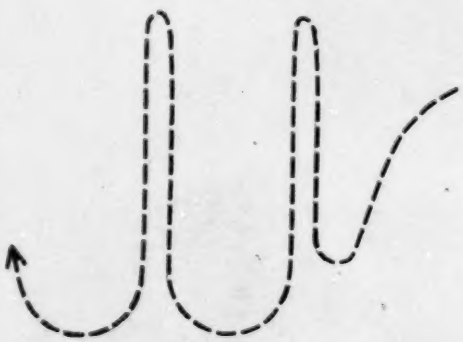
The island is on a flyway, a "bird freeway" between Canada and South America. Many birds stop on the island, or in the bay just off the island, to rest and eat in preparation for more cross-country flying. Many of these

migrating waterfowl, like brant and ducks, and land birds, like white-crowned sparrows and robins, may be seen from the island.

The hummingbird is one of the more beautiful occupants of the chaparral. These tiny birds go from flower to flower collecting nectar.

***Hummingbird mating ritual***

Mating rituals and displays are common among animals. The best display assures the animal gets a mate. During the spring the hummingbird male can be seen performing some elaborate mating rituals to win a wife. In one type of ritual, a male of one species flies straight up in the air about 100 feet, stops, and then dives at more than 100 miles per hour into a canyon. At the bottom, he swoops up in a short curve which makes the pattern of its dive look like a big J. He then does this again and again to impress the female.



*Hummingbird's mating ritual*

*Hummingbird*

## Point Ione, Raccoon Straits, and San Francisco Bay

The most eye-catching feature of Point Ione and the road from Ione to Camp Reynolds is the water. Raccoon Straits, the 180-foot-deep channel which was cut by the ancient Sacramento River, and the rest of San Francisco Bay dominate your field of vision.

***Rough water***

The currents of the river and the currents of the ocean meet below and just to the west of Point Ione. During an incoming tide, the rushing water coming from the ocean fights against the outgoing water of the river. The result is a very rough patch of water. Rough water is found anywhere a river current meets an ocean tide. Because the rough water corrals the fish into certain areas where they can be easily caught, the area just west of Point Ione is a favorite of fishermen and of the sea and coastal birds which live on the island or in the water around it. Point Ione is one of the best places in San Francisco Bay to see a large variety of seabirds.

***Migrating birds***

In the trees below the point nests an occasional heron, either the great blue or the black-crowned night heron. Ducks, on their way to and from the southland on their yearly migrations, can often be seen paddling about in the water. Among other easily identifiable birds are grebes, egrets, pelicans, and kingfishers.

*Great blue heron*

*Snowy egret*

*Western gull*

*Cormorants*

The channel where these birds eat is a deep one, containing several varieties of fish. Bottom fish like the starry flounder are common. Migratory fish like salmon, striped bass, and sturgeon commute through the straits on their way up to the rivers of the Sacramento Valley, where they will lay their eggs and produce more young.

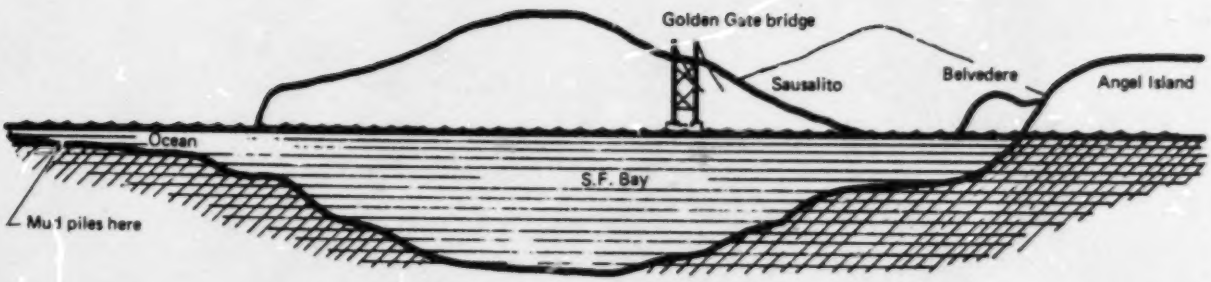
Because the currents flow so swiftly through the channel, there is much oxygen for animal life. Raccoon Straits is one of the few places in the world where tidal life, which is normally found only in the top few feet of the sea, can be found very far down in the water. Divers and researchers from the Oceanic Society and Steinhart Aquarium have found intertidal life as deep as 100 feet. This is very rare.

***Intertidal life at great depth***

One of the things to notice about the bay currents is that they are often different colors. One current might be a deep brown and another a dark blue. The dark blue is ocean water, the deep brown is the muddy water of the Sacramento River. These currents don't always mix well and sometimes can be seen next to each other. The debris on top of one current will float in one direction, while debris on the other current will go in the opposite direction.

**Cross-Section of Golden Gate**

**Showing Siltation**



***Siltation***

When ocean and river currents meet, something else usually is happening. As the river broadens and slows, it drops its load of sand and mud. Also, the salt and other minerals in the seawater cause a reaction that makes the mud in the river current drop to the bottom. This is called siltation, and it is causing the bay to fill up more and more each year. Lage parts of the bay are now only 8 to 20 feet deep.

***Straits swept clean***

This reaction is not taking place at Raccoon Straits because the current is too swift. It acts like a broom to sweep the mud away. The mud is driven out of the bay and dropped in the ocean. For this reason, the ocean a few miles outside the Golden Gate is actually shallower than at the Golden Gate or Raccoon Straits.

***Mixed Evergreen Forest***

On the sheltered east side of the ridge behind Point Ione is mixed evergreen forest almost identical to that in the canyon near Point Campbell. Please refer to the Point Campbell section on page 13 for a description of this area.

## Grassland

On the windy west side of the ridge behind Point Ione is grassland. This is a fairly open area, with some scattered bushes and lots of annual grasses. Annual grasses are those that come up with the first rains in the fall and are usually dry and brown by summer. The grasses here include wild rye, wild oats, and foxtails, among others.

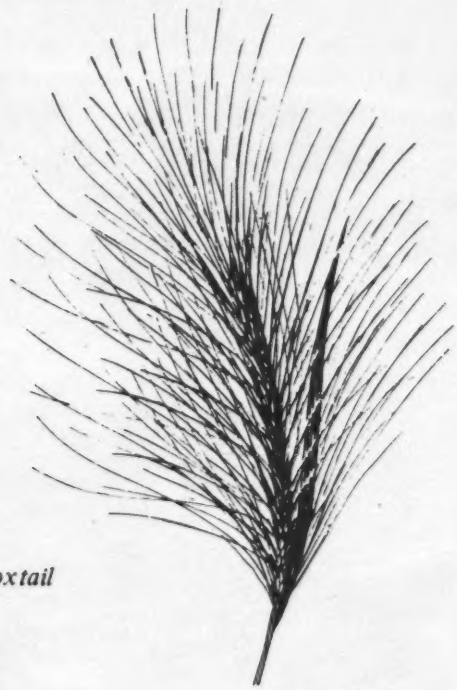
***Annual grasses***

This is the natural home of the tiny vole or meadow mouse, which is also found on many other parts of the island. There are too many animals here and not enough grass to support them all, so voles have gone to other places. Snakes are also common in the grassland. Flying over the grassland are predator owls and hawks. Deer feed out in the open when not disturbed by humans.

***Vole or meadow mouse***

By the 1840s, sailors and other people had cut down almost all the trees on the island. Grasses grew back first, then bushes and shrubs, then trees. This process of regrowth is called plant succession. This area may eventually change from grassland to low bushes, but lack of moisture and almost constant wind will make it difficult for mixed evergreen forest to take over.

***Plant succession***



*Foxtail*

### *The Planted Forest*

Below the ridge of Point Ione in a more sheltered, lower area is a tall forest of Monterey pines and eucalyptus. These were planted to act as windbreaks and to provide wood. Very little grows beneath these tall trees. The sun is prevented from reaching the ground. Seeds never have a chance to grow.

***Eucalyptus***

The ground below the eucalyptus is particularly bare. The trees release an aromatic substance that inhibits the growth of other plants and keeps the forest floor free of bugs and other animals. Aside from herons, which roost in the tops of the tall trees, and hummingbirds, which gather nectar, not many birds or other animals are found around eucalyptus groves.

***Pines***

The pine groves are dark, but the pine trees are much more full of life than the eucalyptus. The pine trees are home to beetles, pine borers, and other little insects. On any day you can see insect-gleaners getting their daily food. The creeper, a bird, starts his insect search at the bottom of a pine tree and works up. The nuthatch starts at the top and works down.

***Starling***

In both the eucalyptus and pine, you can see starlings. These are nonnative birds from the eastern U.S. where they were first introduced in the 1890s. They eat a large variety of food and are very aggressive consumers. They are quite common now in the Bay Area and are taking the place of many native California birds. The starling, like the deer and the eucalyptus, is another example of how people, without thinking, can change the whole balance of nature. This is especially true on a small island like Angel Island.

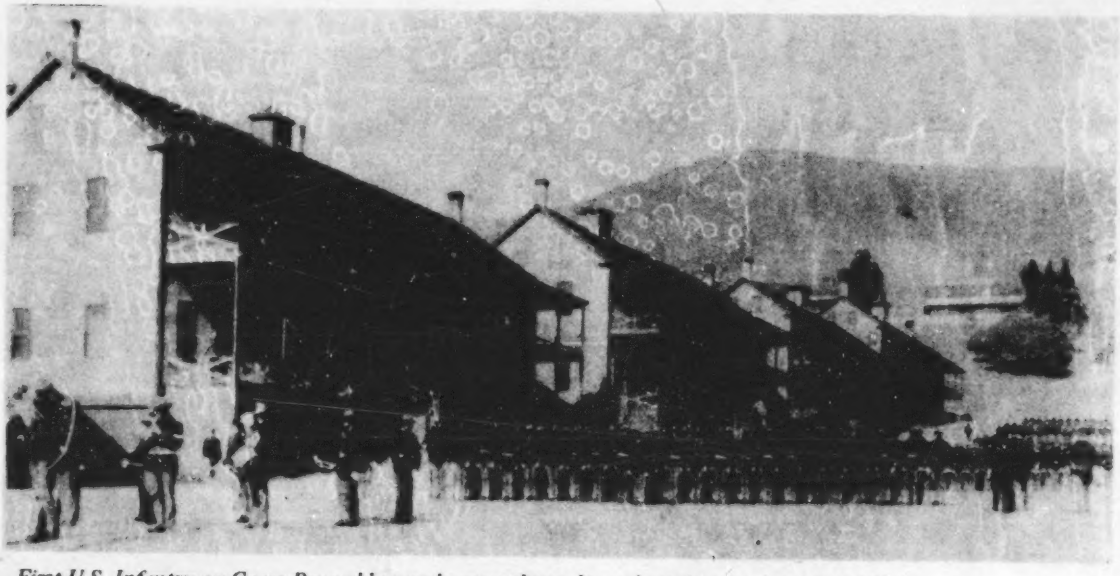
**West Garrison (Camp Reynolds)**

*Best study area*

Camp Reynolds was headquarters for various infantry regiments from the mid 1860s to 1910. It is probably the best single area for environmental study anywhere on the island. Here you can see development, and how the processes of nature are reclaiming some of that work.

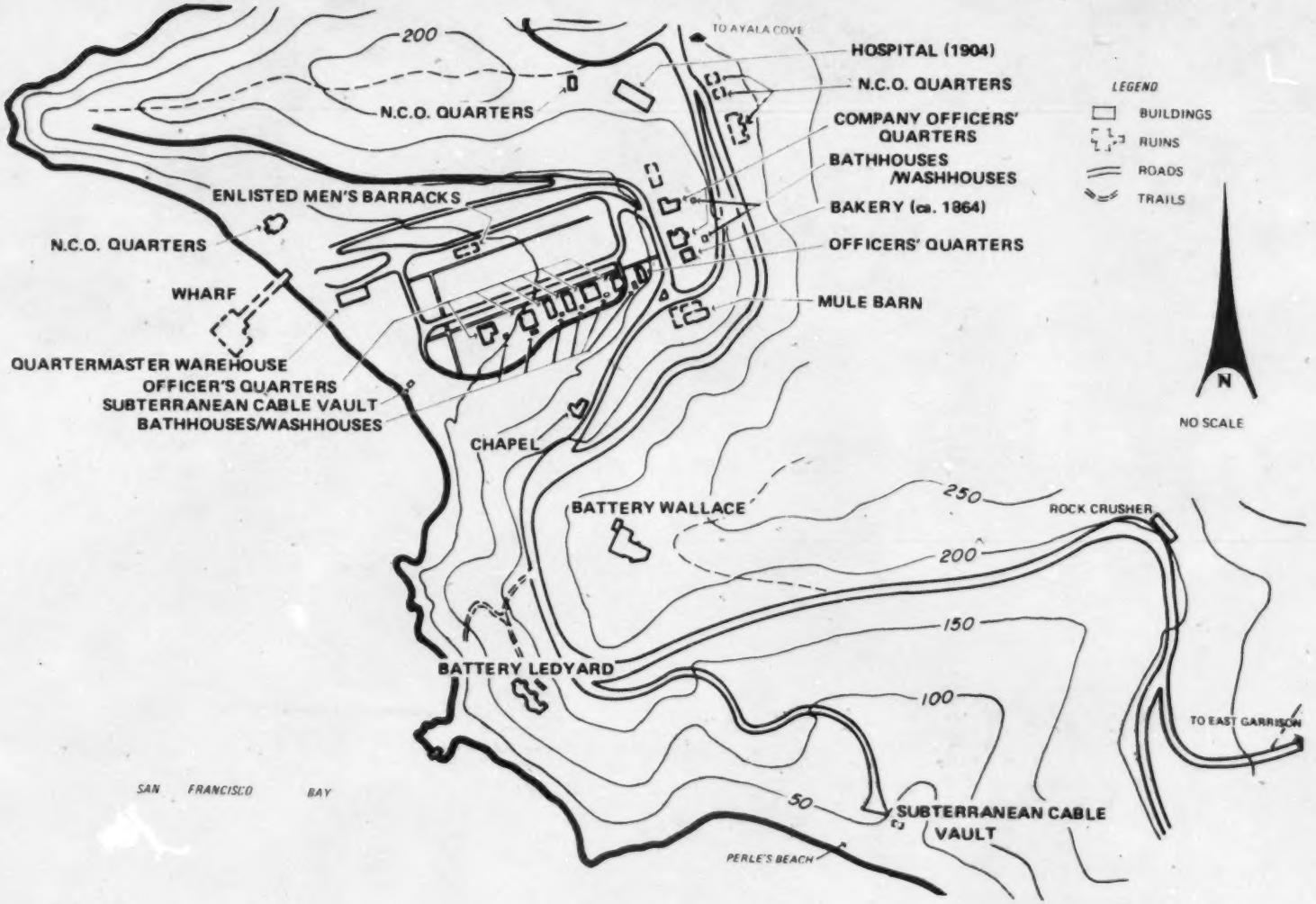
*Nature takes back land*

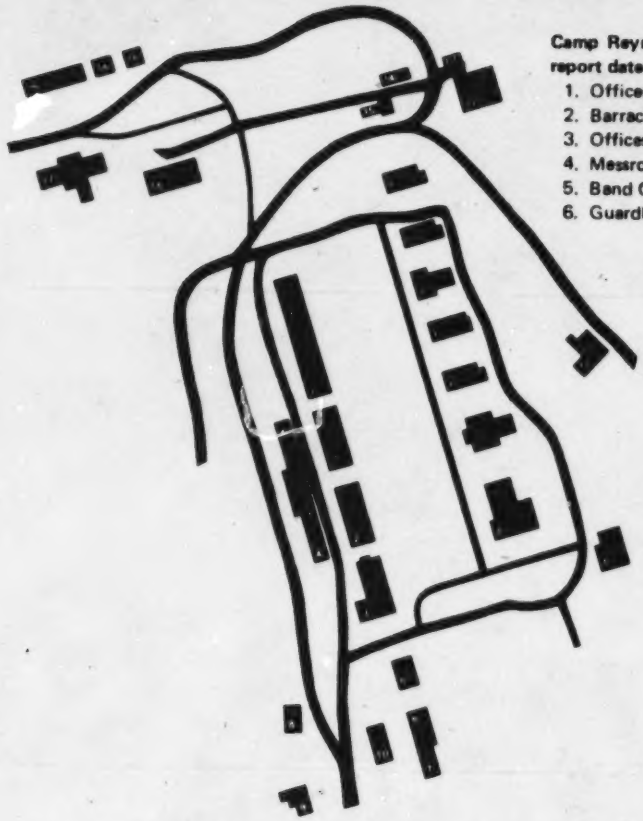
The impact of people at Camp Reynolds is not as great as it once was, and much less than at Ayala Cove. Today the developed area of Camp Reynolds includes several of its former buildings like the officers' homes and the quartermaster's warehouse. But many other old buildings are gone. The big two-story barracks which were on the north side of the parade ground are gone. However, the cut made in the hill for these buildings is still there. The first story of each barracks was for the company's mess hall with the kitchen and storage rooms for food and clothing. There were also rooms for the unmarried sergeants. The second story was for the men's sleeping quarters.



*First U.S. Infantry on Camp Reynolds parade ground standing a battalion muster, circa 1896*

## CAMP REYNOLDS
## AS IT IS TODAY





**Camp Reynolds (West Garrison) as described in an official U. S. Army report dated January, 1877.**

1. Officers Qtrs.
2. Barracks
3. Offices
4. Messrooms
5. Band Qtrs.
6. Guardhouse
7. Ord. Storehouse
8. Post Trader
9. Com. Sgt. Qtrs.
10. Old Schoolhouse
11. Chapel
12. QM Stables
13. Blacksmith Shop
14. Carpenter Shop
15. Bakery
16. Laundress Qtrs.
17. Hospital

*Parade ground*

The parade ground is still there, but the green grass is now being taken over by grasses and weeds which can survive without as much water. On occasion you will find the tunnels of the Angel Island mole weaving across the grass. The houses on the south side of the parade ground were once officers' quarters and are being restored for future generations to see and appreciate.

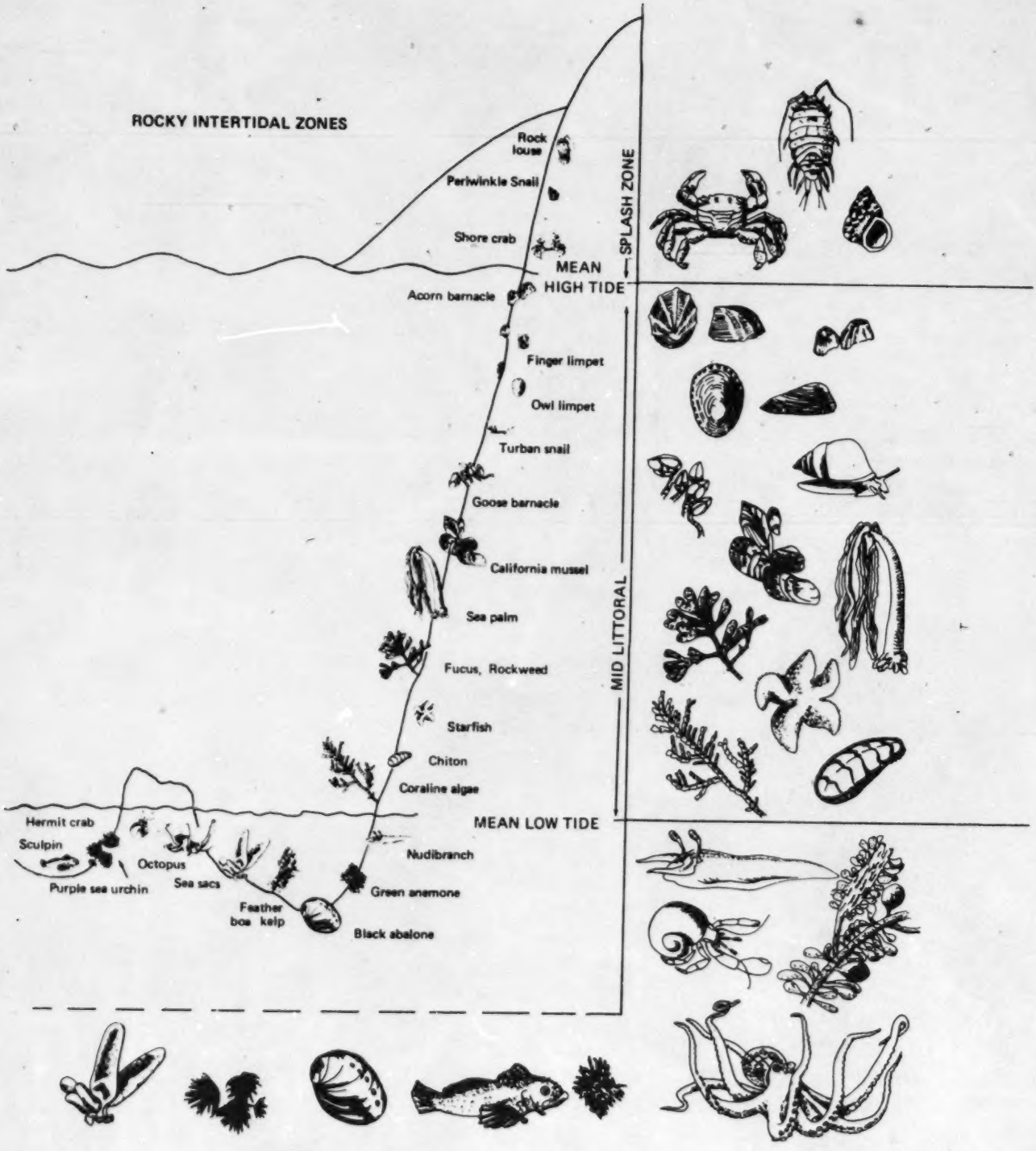
People have changed this area, but plant growth has taken back large parts of the old military post. The animals of this area are typical of those living in dry grasses and chaparral. There are not many animals to be seen because enough people visit the camp to scare them away. However, on your visit here you will probably see some mole tunnels and some lizards, snakes, and birds that are common elsewhere on the island.

*Quartermaster's warehouse*

Near the water is the quartermaster's warehouse where food supplies were kept for the army. It also contained a store and a card parlor for the soldiers to meet and drink in their off-duty hours. Today only house mice are found in the old building.

Next to the warehouse are the pilings and remains of the loading dock where supplies were brought by ship.

**32**


ROCKY INTERTIDAL ZONES
Rock louse
Periwinkle Snail
Shore crab
MEAN HIGH TIDE
SPLASH ZONE
Acorn barnacle
Finger limpet
Owl limpet
Turban snail
Goose barnacle
California mussel
Sea palm
Fucus, Rockweed
Starfish
Chiton
Coraline algae
MID LITTORAL
MEAN LOW TIDE
Hermit crab
Sculpin
Octopus
Purple sea urchin
Sea sacs
Feather boa kelp
Nudibranch
Green anemone
Black abalone

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## *Coastal Strand*

At the water's edge below Camp Reynolds are a sandy beach and a rocky cliffline south of the beach. The beach here is not cleaned like the one at Ayala Cove and so has much more life on it.

***Pillow rocks***

Some of the most interesting things at the beach are the round, bubble-shaped rocks near the shore. Called pillow basalt, they are a form of lava (volcanic) rocks that were formed when molten lava came out of fissures (cracks) in the ocean floor. The cold sea water solidified the lava in balls with these pillowlike shapes.

*Marbled godwit*

Seaweed and other sorts of dead plants and animals wash up on the beach and provide food for the many types of beach hoppers, sand fleas, and isopods not found at Ayala Cove (see Ayala Cove: Sandy Beach). In times of food shortage, land animals have been known to come to the water to eat the washed-up seaweed and other things. Sandpipers, marbled godwits, and other birds walk the beaches, stabbing the sand with their beaks to get food. On the shore live sand crabs, beach fleas, and other small animals which these birds feed on. You don't see as many of these birds at Ayala Cove because the great numbers of people scare them away.

***Intertidal Life***

At the foot of the cliffs can be found plants and animals that are especially adapted to living with the rise and fall of the tide. This intertidal life, as it is called, benefits from the action of the waves and the changes in water level. Different living things prefer different water levels among the rocks. Some have to be covered by seawater and have lots of light to survive. These live just below the low-water level. These plants and animals include sculpin (a small fish), sea urchins, hermit crabs, starfish, and some types of small coldwater sponges, kelp, and algae. Others live higher up on the rocks and are exposed to the air during low tides. These include the California mussel, limpits, barnacles, sea slugs, and some types of seaweed. At the highest levels are plants and animals that only need to be splashed by the sea water. They include shore crabs, rock lice, and some types of algae.

## Serpentine Ridge

Running like a wall from north to south on the grassy ridge behind Camp Reynolds is a strong spine of slippery, almost soap-like bluish-green rock, called serpentine. (See page 5 for more information about serpentine.)

*Bay tree*

The plants and animals of the serpentine ridge are very similar to those of the other rocky areas of the island (see Ayala Cove: Rocky Area). One exception is the bay tree, whose fragrant leaves are sometimes used as a spice. It seems to prefer to grow near these rocks, and not near the other rocky areas.

Butterflies are very common here, including the tiger swallowtail and the buckeye butterfly. In spring they can be seen emerging from their cocoons and drying their wings.

*Quarry*

The ridge goes all the way across the west side of the island. It touches the main circle road on the south side. During the army's occupation of the island there was a rock quarry where serpentine was dug for roadbed material. The quarry was not successful because this crumbly rock makes poor roads.

*Salamanders*

Above the quarry, just east of the serpentine, are two small ponds. It is a moist area where the tree salamanders of Angel Island live. They eat small bugs and seem to survive fairly well here, away from most of the visitors who come to the island. The ponds have very little life in them. These could be teeming with life, but either chemicals from the nearby rocks or else the goldfish planted in the ponds seem to keep the pools rather free of other life forms. On the edge of the pond one can see the scouring rush. It looks like a baby's bottle brush on its end. It is called "scouring" because it has little sandlike particles all over it which makes it feel like a scouring pad.

## Mount Livermore

One of the most spectacular views on the whole island is from Mt. Livermore. From its peak, a person has a complete view of the bay. You will probably approach the summit from the north side of the island, by way of either Point Campbell's ridge on the east or Point Ione's ridge on the west. From the peak, San Francisco is to the southwest, the Bay Bridge south, Oakland southeast, Richmond east, Marin County north, and the Golden Gate Bridge west. Much of the island can be seen from the peak. For information on those areas of the island you can see from the peak, refer back to the appropriate sections in this book.

The view from Mt. Livermore makes it one of the special places on Angel Island, and should be seen by every visitor. The hike is all uphill and not easy work, but the reward is worth the effort.

*Mortar rock and pestle*

*Reed bundle boat known as a balsa*

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## CULTURE

### Introduction

*Cultural groups*

The story of the many cultural groups who have used or inhabited the island reads like a mini-history of California. Among the people are the Coast Miwok Indians; Spanish, British, and New England seamen; Mexican ranchers; the American frontier army; Chinese, Japanese, and European immigrants; and present-day tourists from all over the world. Of all the groups represented on this list, the Native American Indians and the U.S. Army stayed on the island the longest. These vastly different cultures used the island's environment in very different ways.

*Immigrants*

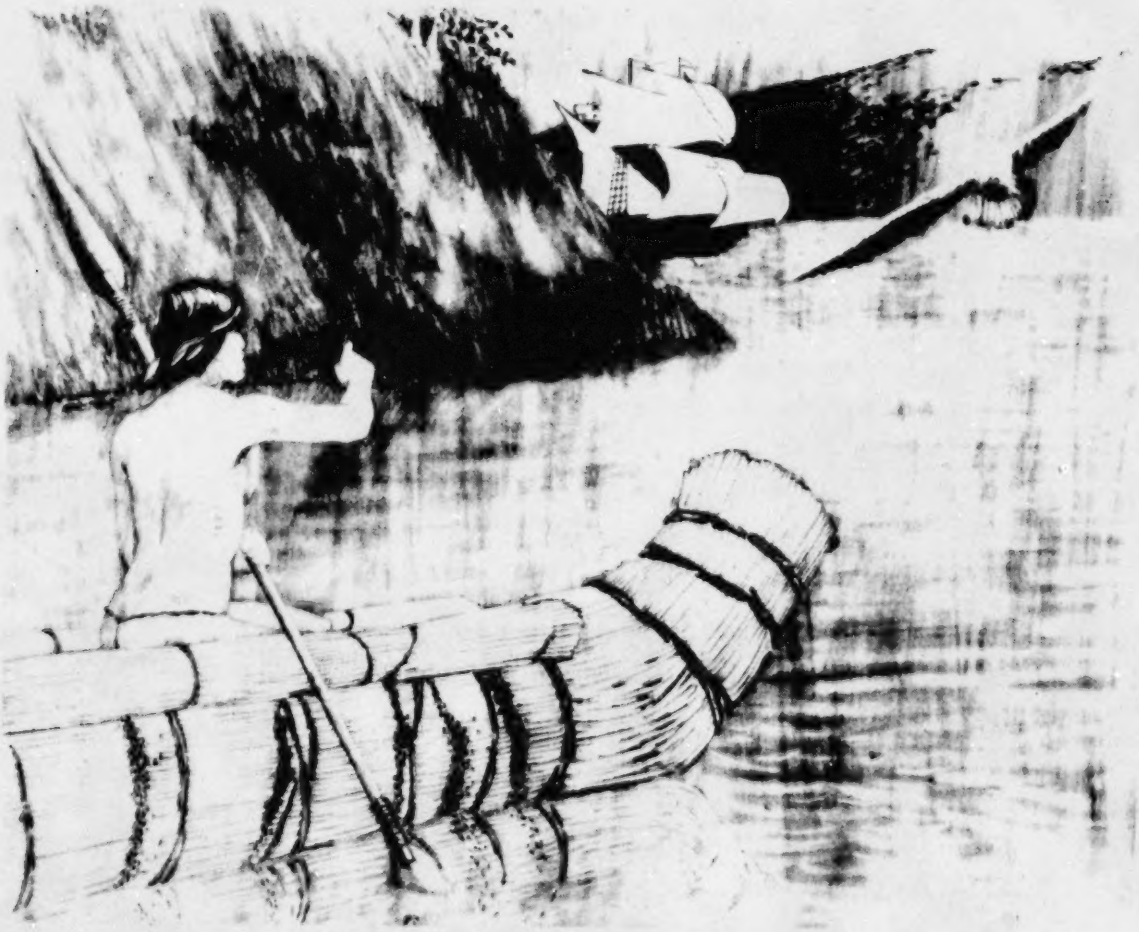
It is important to note that the immigrants who passed through the old immigration station at North Garrison from 1910 to 1947 played a large part in the cultural heritage of California. However, they did not affect the island's ecology very much. Although we recognize the importance of their contribution to California, our discussion of cultures here is limited to those that most affected the environment and ecology of the island itself. If you are interested in the immigration station and the cultural and historical contributions of its one-time occupants, we suggest contacting the Angel Island Immigation Station Historical Advisory Committee, c/o California Department of Parks and Recreation, P.O. Box 2390, Sacramento, CA 95811.

### Native American Culture

*Coast Miwok Indians*

Angel Island lies on the boundary between two different California Indian peoples – the Coast Miwok, who lived in what is now Marin County, and the Costanoans of San Francisco and the East Bay. It is not known whether both cultures occupied the island. It is likely that only the Coast Miwok had permanent villages on Angel Island.

Long before Sir Francis Drake became the first European to set foot on the northern California coast in 1579, the Coast Miwok people lived in the area of present-day Marin County. When the Spanish arrived, the Coast Miwok



were living in permanent communities, and had a very good economy based on hunting, gathering, and trade with their neighbors.

*Europeans arrive*

The Coast Miwok were some of the first California Indians to have contact with European sailors who were drawn to the shelter of the bay. More and more Europeans and other people from various parts of the world came to live in the area. They brought a different way of life (missions, farming methods, trade, and the like) which greatly changed the Indians' life-style. The Native Americans had no resistance to the strange diseases these new people brought and so many died that the Coast Miwok culture was all but destroyed.

San Francisco was settled by the Spanish in 1776, the year the Declaration of Independence was signed. By 1860, only small groups of Miwok remained, mostly on private ranches at the old Spanish missions at San Rafael and Sonoma. By 1930, all but a few Miwok were gone, and the Miwok culture was no more. In less than 200 years, European customs and European sickness killed off a whole culture.

Who were the Coast Miwok and how did they live before the Europeans arrived?

*Hunting, gathering*

The Coast Miwok were a hunting and gathering people who picked and dug plants and hunted animals. In the hills and valleys they hunted deer, snared birds, and gathered acorns and wild seeds. On the bay and ocean shores they speared fish and collected mussels and clams. In the rivers they netted salmon and other fish.

*Land was supplier*

The land provided the Coast Miwok with their needs. The Coast Miwok houses, tools, and works of art were all made of materials that came from the earth and were returned there when the items were no longer useful. The grass and wood homes would fall and become part of the soil. Even Coast Miwok art, such as their beautiful bird feather headdresses, all came from the earth and returned to it. They left no stone tablets or concrete buildings, only the remnants of their wood homes, their natural products, and tools.

*Cultural remains*

The reducers have done their job and turned the Coast Miwok's natural products into soil. Only beads and shells and some Coast Miwok stone and bone tools are left today as a reminder that they once lived in Marin. These things are most often found in what is commonly called a shell mound. These mounds are found at almost every village where the Coast Miwok settled for a long time. They provide a record of where and how the Coast Miwok lived.

**Social Organization**

Much of what we know of Coast Miwok social organization was obtained more than 40 years ago by scientists who talked to a few remaining Coast Miwok. This folklore told of a culture rich in mythology, custom, and art. It described a culture that lived on the land for thousands of years without changing it. Had the Coast Miwok culture survived, our culture could have learned a great deal from the Coast Miwok way of life.

***Central Village***

*Social center*

The social center of each Coast Miwok community (or tribelet) was the central village. Ten or more families might live in the central village, with others living in small settlements in the area around it.

*Ceremonial house*

The ceremonial house was used by members of the secret society who were in charge of the rituals and religious ceremonies of the tribe. This house was built underground and was about 15 feet or less in diameter. It was a place for the leaders to come and prepare themselves for a particular religious activity. A few rituals, such as the curing ceremony, took place inside the house.

Dances were a very important part of Coast Miwok life. They were both a religious and a social activity. Most Coast Miwok dancing was informal and carried out in the village area with little or no advance preparation.

*Sweat house*

Besides the ceremonial house the central village included family dwellings, acorn storage bins, and a sweat house. Almost every small settlement had a

sweat house. It was needed for the preparation ceremonies for the men's hunting, and was also used as a kind of sauna bath and a place to tell stories and socialize. The sweat house was built completely underground.

*The Family*

In some villages more than one family may have lived in the same house. These families included the mother, father, children, and perhaps grandparents.

Work was generally divided between men and women. Men hunted and fished while women gathered acorns and shellfish and prepared meals. Men might also make shell money or feather ceremonial gear, while women wove

***Division of labor***

baskets, fashioned mortars and pestles, cooked and prepared food for storage, and cared for the children.

***Wealth***

For the most part, evidence seems to indicate that wealth (things like balsa boats, shells, and other items) was passed from father to son, or patrilineally. However, some anthropologists believe the oldest wife living in a house was the actual owner.

## Social Classes

***Skills earned status***

The Coast Miwok didn't have formal class lines like some other California Indians. A man's status was earned by his skill as a leader, hunter, or craftsman, or by a combination of these skills. Power and leadership did not necessarily pass from father to son. Instead, leaders and their aides had to earn the right to lead. Like many cultures, the Coast Miwok had their rich and their poor. Some men were good hunters, makers of shell money, or craftsmen. If these men also had wives who made fine baskets or gathered food especially well, then the family would gather wealth. Other families were not so successful.

***Hoypuh respected***

*Headman and Aides:* The headman or "hoypuh" was elected by the people of the tribal community. He was chosen for his skill as a leader and politician. But he was a figurehead, without the power to command people to do anything. Instead, the hoypuh would suggest to his friends and aides that a job, like repairing the sweat house, needed to be done. They in turn would tell others. People would then begin work on the job because they respected and liked the hoypuh – not because he told them to do the job – and also because the hoypuh most often was a very well-to-do man.

Since the hoypuh was in a position of considerable esteem, he usually acquired much wealth. It was the custom for visitors to the village to bring him gifts. During times of need or when someone did something particularly

pleasing to the hoypuh, he would distribute some of his wealth. It was not uncommon for the hoypuh to give food or tools to the needy.

The headwoman or "maien" was often in charge of spiritual and artistic matters of the village. She might set the schedule for dances, ask that certain decorations or feather objects be made, or direct the building of a ceremonial house. She and the hoypuh were important people at all the ceremonial dances.

***Maien***

*Artisans, Hunters, and Costume Makers:* Each man and woman had many jobs. A man would hunt, make shell money, set traps, skin animals, and make costumes. A woman would cook, gather food, and weave. Some men and women were better at one task than others. The person with a special skill like hunting would spend more time at that job than someone who was not as good. A good shell-money maker spent more time at that occupation, while women who were good at basketmaking might spend extra time doing that. People then traded the products of their specialities for shell money or other items like food.

***Many jobs***

*Shaman:* To the Coast Miwok, almost every object had a soul or spirit. The spirit of a rock, a tree, a hill, or a deer could affect the life of any Coast Miwok. The shaman was the man who knew these spirits well. His knowledge of spirits made him both revered and feared.

There were good shaman (healers) and evil shaman. The healing shaman cured people of illnesses caused by bad spirits and other things. There were two types of good shaman. The sucking shaman got his power to cure from a special spirit that came to him. He was able to cure by sucking the wound of an ailing person. The other type of shaman got his powers from long hours of learning and practice with an older shaman. The evil shaman was usually one who had acquired his power in a vision and then used it against others out of greed.

***Good and bad shaman***

*Secret Society:* If any class lines existed in Coast Miwok culture, it was between members of the secret society and nonmembers. The secret society

*Powerful group*

was a group of men and women who held special dances and activities apart from the rest of the tribelet. It was considered an honor to be a member. Not a great deal is known of its activities, but there is some evidence to indicate the society held considerable political power. Membership was by invitation. The hoypuh had to be a member of the secret society because he was always the elected leader of the ceremonial house which was used by the society for their meetings.

**Religion**

*Natural cycles*

The Coast Miwok religion was closely tied to the cycles of the natural world. All Coast Miwok felt close to the land and knew that they must be in harmony with the spirits of all places and things. If one angered the spirits, sickness could result. The Coast Miwok had many special rules which told them what to do and what not to do, so they would not anger the spirits of their world. If a rule was broken, a person and his or her relatives and friends were all expected to suffer.

*Birds special*

Birds were considered special animals in the Coast Miwok religion. They were thought to be helpers of people. One myth attributed to the Coast Miwok tells how the robin got its red breast while helping to steal fire from the gods to give it to man. The heat of the fire changed the color of his feathers. Many Coast Miwok felt that their family ancestors were birds. Bird costumes were worn by many people at the special dances. Other animals were honored in much the same way.

*All life important*

To the Coast Miwok, all life was important. People were thought to be no better than other animals. Before a hunt, the men spent much time in the sweat house, praying and asking the souls of deer and other animals for permission to kill their bodies so they might eat.

**Myths**

*Myths explain*

Almost every myth tried to explain why things are the way they are. Man had fire because the robin stole it for him. The night was the result of a witch borrowing the sun. Coast Miwok myths often mentioned the spirits. Today, science uses experiments and logical thinking to explain our world.

## Technology

*Natural materials used*

The tecnology of the Coast Miwok was based on the use of natural materials, like wood, stone, grasses, and animal parts. Tools were made from a variety of natural objects. Bows and arrows were skillfully made of wood, gut, feather, and stone. Finely shaped arrowheads were fashioned from obsidian (a volcanic glass) and chert. The mortar and pestle, used by women for grinding acorns and other grains, were made of stone. Many well-designed snares and traps were produced and used to catch fish, birds, and small animals.

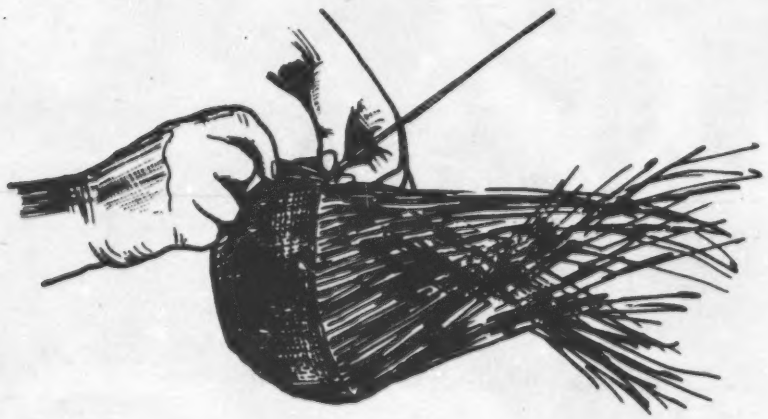
*Shell money*

Shells were made into money which was then traded all over central California for valued things like obsidian and tasty acorns. Coast Miwok shell money was the standard of exchange in much of California.

For transportation, the Coast Miwok walked or used a reed bundle boat known as a balsa. The balsa was used for fishing and to travel on the bay and rivers. Boats were built to carry one or two people.

*Art*

Natural materials were also used in Coast Miwok art. Beautiful objects were made from bird feathers, bone, and wood. Unfortunately, very few of these exist today. The only known samples of Coast Miwok feather art were collected by Russian trappers and are exhibited today in a Moscow museum.



*Barracks and parade ground, Camp Reynolds (early 1890s)*

*Photo courtesy of National Archives*

*Interior of barracks*

*Photo courtesy of National Archives*

## U.S. Army Culture on Angel Island

The army on Angel Island had a culture, but not like the Indians. The army had a definite life-style and a way of using the land that greatly differed from the Coast Miwok. The Coast Miwok made changes on the land, but not as large or as long-lasting as the army's. The army's cultural impact was greater than any other in the island's history. We can learn a lot about the two cultural groups by comparing them.

*Greatest impact*

Both the Coast Miwok and the army used the island for the basic human needs of food, water, and shelter. The Indians used what existed on the island and brought very little with them. The army, on the other hand, brought most of their food and much of their special building materials from elsewhere. The men of the army did not depend on the resources of the island and most of them had never had to live entirely off the land.

The army came to Angel Island in 1863-64 to build cannon batteries as part of the defense of San Francisco Bay. Many Californians believed that Confederate ships might attack San Francisco. To support the batteries the army built houses, barracks, storerooms, offices, and stables for the work animals. These buildings were more permanent than anything the Indians had built.

*Why the army came*

Army life was regimented, filled with routine duties, and often boring. Discipline was very strict. The common soldier's pay was low, but there were benefits such as shelter, food, clothing, and medical care. Men joined the army for many reasons, some to run away from their past life, others because they could not find a job, and others to find adventure in the "wild west." They usually found the army long on hard work and short on adventure.

*Regimented life*

### Social Organization

The company, a group of 40 to 80 men, was the main orgainzation of the 1870s U.S. Army. Unlike today's army company, which many soldiers enter and leave over a period of years, the company of the 1870s seldom changed.

*The company*

The captain, the head of the company, was often 50 or 60 years old. The sergeant and other noncommissioned officers were lifetime soldiers, and even many of the privates spent 10 to 20 years in the service.

*Enlisted men*

The men came from all over the United States and many were from foreign countries like Italy, Germany, Ireland, and Mexico. Black Americans served in segregated regiments. Many of the immigrants from Europe had served in foreign armies; they often spoke little or no English and had enlisted in the army as a way of becoming American citizens. Many lifetime soldiers considered their company as their family and were very proud of the traditions and honor of their regiment. Rarely was the whole regiment (10 companies) all together, so the enlisted men's life revolved around events in their company.

*Company was family*

*Army food*

Food was very plain and centered around dried rice, potatoes, bread, and beef. Often each company on Angel Island had a vegetable garden and several men would be assigned to tend it. These gardens were fairly large; often enough had to be grown to feed 50 or more men. For special occasions, like Christmas, the men would pitch in part of their pay to buy fancy luxuries from the post trader who operated a store on the island.

*Vegetable gardens*

### *Social Classes*

*Officers and men separate*

The social life of the company was strictly divided between officers and enlisted men. The officers included lieutenants and captains. The enlisted men included privates, corporals, and sergeants. The only contact between these two groups of men was during work, when officers gave commands and enlisted men carried them out. Officers and men had separate recreation areas, living quarters, and eating areas. Only when the men were on patrol, fighting, or playing an occasional sport, like baseball, were the class lines broken even a little bit. The whole system was carefully segregated. The separation was thought to create a more effective army. The theory was that soldiers would not fight under or respect officers if they were friends. Today's army is not very different, although the life of the enlisted men is much better.

An officer at Camp Reynolds had his own room or shared a room with another officer. Some officers had homes and families at the camp. The enlisted men didn't make enough money to marry. They lived in barracks with 20 to 40 other men, and no privacy.

*Routine daily life*

As in today's army, the life of the common soldier in the late 1870s was routine. Every day was like the next: up in the morning, clean the barracks, go to formation, go to mess, do the daily tasks, clean the fort area, stand at night formation, then maybe play a game of cards before going to bed. The monotony was especially bad at Camp Reynolds, which was far away from the fighting of the Indian wars or the Philippine theater of the Spanish-American War. Constant spit-and-polish perfection, ceremony, and inspections were emphasized at a post like Camp Reynolds to keep soldiers busy and to prevent desertion. There were often as many as six inspections a day to check up on the men.

### *Specialization*

*Special jobs*

Every man in the company had a special job. A man was given a job and this became his responsibility every day. There were leaders and followers among the men. Some were in charge of cannons, while others simply carried rifles. Some took care of horses, while others cooked. No man did more than a few types of jobs while the company was in camp. Sometimes on marches, or on patrol, a man might be his own cook, take care of his own horse, and do more than just one job, but this was not very often. This life-style was very different from that of the Indian man who took care of most of his own needs himself. The Indian even made his own tools and built his own home.

### Religion

*Not too religious*

Most of the men of the army were of European origin and Christian. There were Catholics, Protestants, Episcopalians, and Unitarians, among others. Most of the men were not terribly religious, but the army encouraged them to go to church.

*Chaplain Allensworth*

This post had a chaplain, who provided religious leadership. Sometimes he helped the soldiers through difficult times. He often taught school at night so that the soldiers who couldn't speak, write, or read English could learn. Colonel Allen Allensworth, one of the first black men to be an officer in the U.S. Army, was one of Camp Reynold's chaplains. Later in his life, Allensworth established a San Joaquin Valley town that bears his name.

**Technology**

*Foot-and-horse army*

The army of the 1870s was a foot-and-horse army. An old expression was "forty miles a day on beans and hay," beans for the men, hay for the horses. When the army moved, it would go in long columns of wagons, horses, and marching men. Everything the men needed they carried with them. For the army the land was an alien to be fought along with the enemy. When on a march, its columns set up clouds of dust and left deep rutted trails. If a road was needed, the men cut trees and built roadbeds and bridges.

When a fort was established, the army dug ditches, cut trees, and erected buildings. A wall was usually built. Camp Reynolds, unlike the forts on the Great Plains of the Midwest, did not have a wall.

*Supplies brought in*

The army on Angel Island had its supplies brought to the island, unlike the Indians who once lived there. Instead of fashioning equipment from the land, the army had to bring in its wagons, axes, shovels, and eating utensils. Clothes were made of natural materials like cotton, wool, and leather, but were usually machine-made. Shoes were often made by convicts and quickly fell apart.

*Weapons*

The army's weapons were made of iron. The standard gun for the soldiers on Angel Island in the 1870s and 1880s was a single shot, breech-loading rifle. Repeating rifles, able to shoot several shots without reloading, were used here after 1896. The army also had small cannons and a weapon known as a Gatling gun which was an early machine gun.

The tools of war were far more advanced than the tools or knowledge of healing. For an illness, the doctor might bleed the soldier or use suction from a red-hot tin cup. The popular belief in those days was that bleeding and suction drew the illness out of the body. This practice wasn't very different from that of the Coast Miwok sucking shaman.

*Medicine*

## The Two Cultures-Summary

The Coast Miwok and the army had different ways of viewing their lives on Angel Island. The Indians felt a strong relationship to the land. They felt they were a part of the natural world of the island. They believed the plants and animals had souls and should be respected. They knew the land very well, and knew how to live from it.

*Comparing cultures*

The army soldier was a stranger to the land. Food was supplied to him and tools were made for him. The soldier's entire way of life was ordered for him by officers. The officers were also ordered, with instructions coming from higher headquarters as far away as Washington, D.C.

Because the soldier did not feel a part of the land of Angel Island, he did not care when he changed it. The army dug ditches, poured concrete, built housing and roads, and put up large guns. More changes were made by the army in a few years than the Coast Miwok culture made in several hundred. The effects of these changes have lasted and are still visible on the island today.

*Soldiers not part of land*

## Appendix

## PRODUCERS, CONSUMERS, AND REDUCERS

### (P-C-R)

All living things can be classified as either *producers* (able to trap the sun's energy in the form of food), *consumers* (which depend on producers or other consumers for their food supply), or *reducers* (which depend on dead producers or consumers for their food supply). Here is a list of some of the *producers, consumers,* and *reducers* found on Angel Island.

**Rocky Cliffs**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| sticky monkey flower | fence lizard | beetle |
| coyote bush | hawk | bacteria |
| lilac | wren | fungus |
| primrose | swallowtail butterfly | cricket |
| | buckeye butterfly | |

**Grassland**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| wild rye | mole | worm |
| wild oat | gopher snake | bacteria |
| foxtail | fence lizard | fungus |
| California poppy | buckeye butterfly | beetle |
| | hawk | turkey vulture |

**Chaparral**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| manzanita | deer | beetle |
| soap plant | gopher snake | fungus |
| lilac | Cooper's hawk | bacteria |
| honeysuckle | hummingbird | millipede |
| | | earthworm |

**Mixed Evergreen Forest**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| coast live oak | deer | |
| big leaf maple | Angel Island mole | cricket |
| madrone | owl | pill bug |
| bay tree | scrub jay | bacteria |
| miner's lettuce | towhee | fungus |
| hound's tongue | sparrow | worm |
| fern | quail | slug |
| thistle | gopher snake | snail |
| poison oak | rubber boa | |
| elderberry | | |

**Introduced Forests**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| pine | jay | bacteria |
| eucalyptus | sparrow | pine borer |
| moss (on pine trees) | towhee | beetle |
| (very little else grows | mole | termite |
| on the forest floors | owl | (very few reducers |
| because there is little | | in eucalyptus forest |
| light) | | due to camphor) |

**Developed Areas**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| grass | house mouse | cockroach |
| pine | rat | cricket |
| domesticated flowers | raccoon | termite |
| | deer | bacteria |
| | housefly | fungus |
| | grasshopper | pill bug |

**Intertidal Zone and Coastal Strand**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| red, green, and brown algae | sandpiper | crab |
| sea lettuce (green algae) | godwit | beach hopper |
| coraline algae (red algae) | duck | isopod |
| | mouse | sand flea |
| | limpet | bacteria |
| | barnacle | rock louse |
| | sea anemone | |
| | snail | |

**Deep Channel**

| *Producers* | *Consumers* | *Reducers* |
|---|---|---|
| algae (plankton) | starry flounder | bacteria |
| | sturgeon | crab |
| | striped bass | worm |
| | salmon | |
| | shark | |
| | sea anemone | |
| | heron | |
| | duck | |
| | grebe | |